

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau(43) International Publication Date
20 November 2003 (20.11.2003)

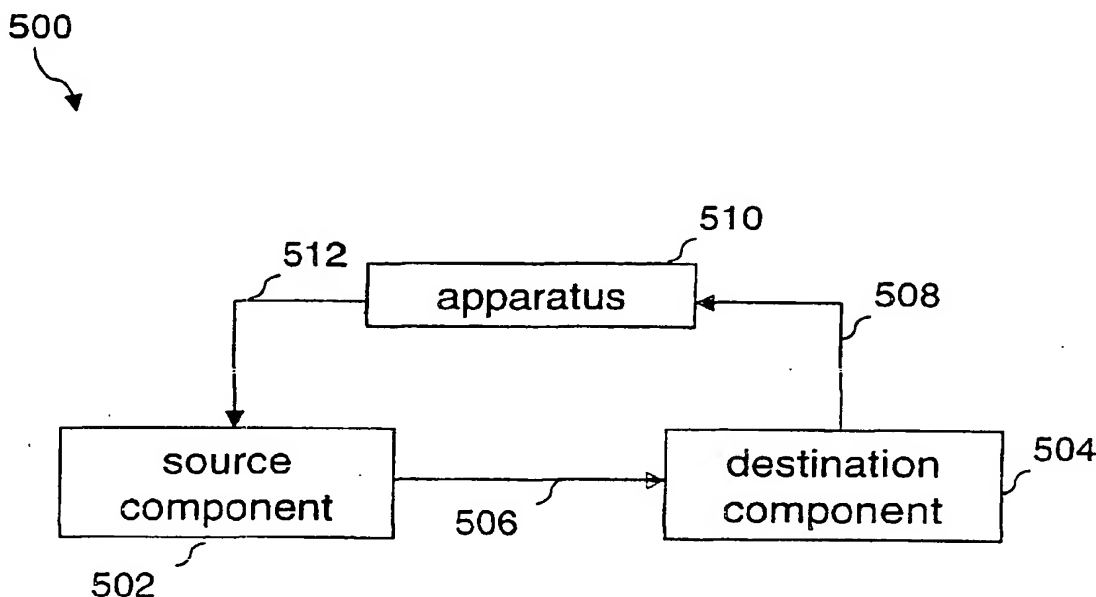
PCT

(10) International Publication Number
WO 03/096695 A1

- (51) International Patent Classification⁷: **H04N 7/173, 5/775, 7/10**
- (21) International Application Number: **PCT/IB03/01747**
- (22) International Filing Date: **29 April 2003 (29.04.2003)**
- (25) Filing Language: **English**
- (26) Publication Language: **English**
- (30) Priority Data:
0210488.3 **8 May 2002 (08.05.2002)** **GB**
- (71) Applicant (*for all designated States except US*): **KONINKLIJKE PHILIPS ELECTRONICS N.V. [NL/NL]**; Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).
- (72) Inventor; and
(75) Inventor/Applicant (*for US only*): **WOOLGAR, David, J. [GB/GB]**; c/o Philips Intellectual Property & Standards, Cross Oak Lane, Redhill, Surrey RH1 5HA (GB).
- (74) Agent: **WHITE, Andrew, G.**; Philips Intellectual Property & Standards, Cross Oak Lane, Redhill, Surrey RH1 5HA (GB).
- (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Published:
— *with international search report*

[Continued on next page]

(54) Title: CONTROL OF AN AV CONTENT SOURCE COMPONENT BY AN AV CONTENT SINK COMPONENT



(57) Abstract: A method is described for a home entertainment system (500) to control the playout of audio-visual (AV) content (506) from a source component (502) (such as a VCR or DVD player), depending on a signal (508) which indicates whether the AV content is being consumed by a destination component (504) (such as a TV or audio amplifier). The method operates without requiring any dedicated user interaction. Optionally, an apparatus (510) may interpret the signal (508) and in response generate commands (512) suitable for controlling the source component, for example by emulating infrared remote control commands. Preferably, the signal (502) and commands (512) are implemented using the Project50 protocol.

WO 03/096695 A1



For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

DESCRIPTION

CONTROL OF AN AV CONTENT SOURCE
COMPONENT BY AN AV CONTENT SINK COMPONENT

5 The present invention relates to a method, apparatus and system for the control of a source component capable of playing out audio-visual (AV) content.

10 A home entertainment system typically comprises one or more source components, such as a VCR and DVD, able to playout AV content and one or more destination components able to consume AV content, such as a display and audio amplifier. Whilst playing a VCR or DVD in a home entertainment system it is possible a user will temporarily switch to another source of AV content, for example a broadcast TV channel in order to check what show is
15 currently being broadcast. Unless the user pauses the VCR or DVD prior to switching, the VCR or DVD will continue playing and the user, when he/she resumes viewing the VCR or DVD, will have missed some of the action.

20 One manufacturer arranged for its VCRs to stop playing and to enter 'standby' mode should the VCR detect that it is no longer acting as a source of AV content for a destination component. However if the destination component subsequently again selected the VCR as a source, to resume playout the user had to separately instruct the VCR to exit 'standby' mode and to commence playing.

25 At the time of filing of the present application, new means of acquiring and storing AV content are emerging; however, the management of these means requires a dedicated user interaction. For example, a Personal Video Recorder (PVR) component is characteristically controlled by the user explicitly asserting and subsequently de-asserting the time-shift feature in order to pause and resume playout of a broadcast TV programme, respectively.

30

It is an object of the present invention to solve these and other problems by means of an improved method, apparatus and system for the control of a source component capable of playing out AV content.

5 In accordance with the present invention there is provided a method for controlling a source component operable to playout AV content to a destination component, the method being managed independently of a user and comprising the steps of:

- 10 a) sensing whether the destination component is presently consuming AV content originating from the source component;
- b) generating a signal in accordance with the result of the sensing;
- c) communicating the signal to the source component; and
- d) in dependence on the signal, suspending or playing out AV content from the source component.

15 The method of the invention relies on identifying an association between a source component outputting AV content and a destination component consuming said AV content. The status of this association may be used to generate a corresponding signal. The signal may be communicated to the source component and be used to control the playout of the source
20 component. It will be apparent to the skilled person that many and varied means may be devised to implement the identification and signalling requirements of the method. Identification of the association between source and destination components may be achieved by use of dedicated means or by use of existing means, such as Project50, see below. Communication of the
25 corresponding signal may be achieved by any suitable wired means including, but not limited to, Scart, IEEE1394/HAVi, powerline or Ethernet; or by wireless means including, but not limited to, radio (HiperLan, WiFi, ZigBee) or infrared (RC5/6, pulse position).

30 One example is a small system comprising one destination component and one source component, such as a TV and VCR combination. A dedicated signal may be communicated from the TV to the VCR to automatically control the playout of the VCR in dependence on the TV being selected, or not, to

present AV output from the VCR. Clearly, other source components such as a DVD player may be used in place of the VCR; similarly, an audio amplifier or a recording component may be used in place of the TV. Although such a system is elegant in its simplicity, it may have limitations in that the system may be difficult to expand to include additional source and destination components. Furthermore the system components may need to be customised (for example to incorporate additional interfaces on each component in order to connect the signal). These and similar 'purpose-built' solutions are not favoured commercially since they incur such additional costs and are potentially incompatible with other brands.

A preferred means to implement the identification and signalling requirements of the method may be to utilise the capabilities of existing techniques already implemented within home entertainment system components. One such technique is AV.Link over Scart (Project50). By monitoring Project50 message traffic between components of the system it is possible to identify an association of destination and source components and to determine when the association is active, or not, and to use this information to control the playout of the relevant source component accordingly. In this way systems comprising large numbers of source and destination components may be accommodated.

It should be noted that the present invention avoids any dedicated involvement of the user.

In accordance with a further aspect of the invention, the method alternatively comprises the following steps:

- a) sensing whether the destination component is presently consuming AV content originating from the source component;
- b) generating a signal in accordance with the result of the sensing;
- c) communicating the signal to an apparatus;
- d) generating a command in dependence on the signal;
- e) communicating the command to the source component; and
- f) in dependence on the command, suspending or playing out AV content from the source component.

An attractive aspect of the invention is that, instead of communicating the signal to the source component, the signal is instead used to generate one or more commands, which commands are suitable to control the source component. One example may be where the source component is an existing legacy component such as a VCR and the command is an infrared command suitable to control the VCR deck functions, such as <play> or <pause> the action of which is to in effect control the AV playout of the VCR. In this or similar ways, existing legacy components in the field may be controlled according to the method of the invention. Other command formats include, but are not limited to, Project50 messages, IEEE1394/HAVi messages, Ethernet messages, powerline messages, radio messages. Means to communicate commands include wired means including, but not limited to, Scart, IEEE1394/HAVi, Ethernet or powerline; or wireless means including, but not limited to, radio (HiperLan, WiFi, ZigBee) or infrared (RC5/6, pulse position). In general, the method of the invention determines that, in dependence on the signal, the source component is controlled to either suspend or play out AV content.

In a further aspect of the invention there is defined an apparatus for controlling a source component, the apparatus comprising:

- a first port operable to receive a signal, which signal indicates whether the destination component is presently consuming AV content originating from the source component,
- a second port operable to output a command, which command is suitable to control the source component,
- a data processing unit operable to decode the signal and to generate at least one command in response to the decoded signal.

By the addition of a suitable apparatus an existing home entertainment system may be upgraded to operate according to the method of the invention. The main function of the apparatus is usually to receive the indication signal and thereby generate commands suitable to operate standard (i.e. unmodified) source components, including legacy components. Clearly, the apparatus may be standalone or alternatively may be incorporated within a source or

destination component. Within a particular system there may be more than one apparatus and more than one component may incorporate an apparatus. The indication signal may be applied to the apparatus via any suitable medium including wired or wireless as discussed earlier; the signal itself may be in any suitable format including, but not limited to, a Project50 message, an IEEE1394 message, a powerline message, an infrared remote control command associated with the destination component or a radio message. The command may be output from the apparatus via any suitable medium including wired or wireless as discussed earlier; the command itself may be in any suitable format including, but not limited to, a Project50 message, an IEEE1394 message, a powerline message, an infrared remote control command associated with the source component or a radio message. As an alternative the indication signal and command may be respectively applied to and output from the apparatus using Consumer Electronics Control (CEC) messages carried over the High Definition Multimedia Interface (HDMI).

In a further aspect of the invention there is defined a home entertainment system comprising a destination component operable to consume AV content and a source component operable to playout AV content in dependence on a signal, which signal indicates whether the destination component is presently consuming AV content originating from the source component. In such a system the source component may be able to interpret the signal and thereby control its playout of AV content.

In a further aspect of the invention there is defined a home entertainment system comprising a destination component operable to consume AV content, a source component operable to playout AV content and an apparatus operable to control the source component in dependence on a signal, which signal indicates whether the destination component is presently consuming AV content originating from the source component. In such a system the source component may be controlled by one or more commands issued by the apparatus in dependence on the signal. The signal may be provided by any suitable means including means independent of the

components of the system. Preferably, the signal is generated by the destination component.

Further features and advantages will now be described, by way of example only, with reference to the accompanying drawings in which:

Figure 1 shows a flow diagram of a first method to control the playout of a source component according to the teachings of the present invention;

Figure 2 shows a flow diagram of a second method to control a source component by means of an apparatus according to the teachings of the present invention;

Figure 3 shows a schematic diagram of an apparatus embodying the method of Figure 2;

Figure 4 shows a schematic of a first system in which the method of Figure 1 can be practiced;

Figure 5 shows a schematic of a second system, comprising the apparatus of Figure 3, in which the method of Figure 2 can be practiced; and

Figure 6 shows an example embodiment of the system of Figure 5 which employs Project50 messaging.

In the present description the term 'AV content' refers to audio and/or video assets, including, but not limited to, picture, sound, text and graphics supplied via any suitable analogue and/or digital signal encoding formats. The terms 'playing out' and 'playout' refer to the action of outputting at least one stream of AV content from a source component. The term 'source component' refers to any product or component within a home entertainment system which is capable of playing out AV content to another (destination) component. The term 'pausing' means suspending the playout of AV content from a source component; in such a mode the output signal from the source component may still be active, for example in the form of a video freeze-frame image. The term 'legacy component' refers to a home entertainment component already in the field.

Figure 1 shows a flow diagram of a first method to control the playout of a source component. The method is shown generally at 100 and comprises a continuous loop process. The consumption, or not, of AV content from a source component by a destination component is sensed at 102. A signal is generated 104 in dependence on the result of the sensing. The signal is communicated 106 to the source component. The AV content playout of the source component is controlled 108 in dependence on the signal. The method then loops back to step 102. In this method the signal represents the continuous present status of AV consumption by the destination component. The method is suitable to a system of home entertainment components which are capable of directly interfacing the signal, an example of such an embodiment is described and shown in Figure 4 below.

Figure 2 shows a flow diagram of a second method to control a source component by means of an apparatus. The method is shown generally at 200. As before, the consumption, or not, of AV content from a source component by a destination component is sensed at 202. A signal is generated 204 in dependence on the result of the sensing. The signal is communicated 206 to an apparatus. The apparatus generates 208 at least one command in dependence on the signal. This command is communicated 210 to the source component. The source component, in response to the command, is controlled 212. The method then loops back to step 202. In general, commands issued to the source component place the component in mode <pause> or <play> such that the component suspends or plays out AV content, respectively. In addition, preferably commands are generated by the apparatus only on a 'state change' – that is, when there is a cessation or resumption in consumption of AV content from the source component by the destination component (as indicated by the signal).

Figure 3 shows a schematic diagram of an apparatus embodying the method of Figure 2. The apparatus is shown generally at 300 and comprises a data processing unit 302 (comprising CPU 304, Program ROM 306 and RAM 308), a first port 312 operable to receive an input signal and a second port 314 operable to output a command all interconnected by means of bus 310 in

known fashion. The data processing unit 302, under control of program instructions held in program ROM 306, decodes the input signal to sense an association between a source component and a destination component and the consumption, or not, of AV content from the source component by the destination component. In dependence on the sensing, the data processing unit may decide to generate one or more commands and forward these to the second port for communication to the source component. The format of the received signal and/or the sent commands may be dependent on the capabilities of the components in the system and also the location of the apparatus in the system (that is, whether the apparatus is standalone or resides within a component).

Figure 4 shows a schematic of a first system in which the method of Figure 1 can be practiced. The system is shown generally at 400 and comprises a source component 402 connected to a destination component 404. The playout of AV content from source component 402 is performed in dependence on a signal 408 generated by the destination component 404 indicating the consumption, or not, of AV content from the source component. The AV content is communicated 406 from the source component to the destination component. The system is compatible with proprietary means to implement signal 408, for example a simple binary signal to enable/disable playout from the source component. Alternatively, where the signal is conveyed using existing means, for example Project50 messages, then a source component with suitable additional decoding software may implement the method. An example implementation is discussed in relation to Figure 6 below.

Figure 5 shows a schematic of a second system, comprising the apparatus of Figure 3, in which the method of Figure 2 can be practiced. The system is shown generally at 500 and comprises a source component 502 connected to a destination component 504; an apparatus 510 is also connected to both components. A signal is generated by the destination component 504 in dependence on the consumption, or not, of AV content from the source component. The signal is communicated 508 to the apparatus 510.

In dependence on the signal 508, the apparatus 510 generates and communicates one or more commands which are communicated 512 to the source component. According to the commands, the source component 502 is caused to suspend or resume playout of AV content. The AV content is communicated 506 to the destination component 504. The system as described is compatible with legacy source components, for example commands issued by the apparatus may emulate infrared remote control commands of the source component, thereby enabling control of the component in order to suspend or resume playout of AV content.

Figure 6 shows an example embodiment of the system of Figure 5 employing Project50 messaging. The system is shown generally at 600 and comprises a DVD player component 602 as depicted by the dashed outline and a TV receiver component 604. The DVD player 602 comprises an apparatus 606 and a DVD deck with associated AV circuitry 608. The two components 602 and 604 have Scart connectors 610 and 612 and are connected to each other using a conventional Scart cable 614. The apparatus 606, DVD deck & AV circuits 608 and TV Receiver 604 transfer Project50 messages using Project50 signal lines 616. The apparatus transfers commands 618 to the DVD deck. The DVD deck & AV circuits transfer AV content to the TV receiver via signal wires 620. In operation, the apparatus monitors Project50 message traffic passing between the TV 604 and the DVD deck & AV circuits 608. The apparatus decodes the messages to sense when the TV is, or is not, acting as the destination component for the DVD AV content playout. In dependence on this sensing, the apparatus issues one or more commands 618 to control the DVD deck & AV circuits 608. Alternatively, the apparatus could issue these commands by sending suitable Project50 messages to the DVD deck & AV circuits 608 via signal lines 616 (in this case, the apparatus could have a single common Project50 port for both sensing AV content consumption and the issuing of commands). In response to the commands, the DVD deck might pause or play thereby controlling the playout of AV content, which AV content is then sent over signal lines 620 to the TV receiver 604. In this example, it is shown that a suitably modified DVD player

can, via Scart, cooperate with a legacy Project50 TV receiver to implement the teaching of the invention. Commercial advantages include the fact that the apparatus can be implemented by a relatively simple software upgrade to a Project50-equipped DVD player, since the player already includes all
5 necessary hardware.

The foregoing implementations are presented by way of example only and represent a selection of a range of implementations that can readily be identified by a person skilled in the art to exploit the advantages of the present invention.

10 In the description above and with reference to Figure 5, a method is described for a home entertainment system 500 to control the playout of audio-visual (AV) content 506 from a source component 502 (such as a VCR or DVD player), depending on a signal 508 which indicates whether the AV content is being consumed by a destination component 504 (such as a TV or audio
15 amplifier). The method operates without requiring any dedicated user interaction. Optionally, an apparatus 510 may interpret the signal 508 and in response generate commands 512 suitable for controlling the source component, for example by emulating infrared remote control commands. Preferably, the signal 508 and commands 512 are implemented using the
20 Project50 protocol.

CLAIMS

1. A method for controlling a source component operable to playout AV content to a destination component, the method being managed independently of a user and comprising the steps of:
- 5 a) sensing (102) whether the destination component is presently consuming AV content originating from the source component;
- b) generating (104) a signal in accordance with the result of the sensing;
- c) communicating (106) the signal to the source component; and
- 10 d) in dependence on the signal, suspending or playing out AV content from the source component.
2. A method according to claim 1 wherein steps c) and d) are substituted by the following steps:
- 15 a) communicating (206) the signal to an apparatus;
- b) generating (208) a command in dependence on the signal;
- c) communicating (210) the command to the source component; and
- d) in dependence on the command, suspending or playing out AV content from the source component.
- 20 3. An apparatus for controlling a source component according to the method of claim 2, the apparatus comprising:
- a first port (312) operable to receive a signal, which signal indicates whether the destination component is presently consuming AV content originating from the source component,
 - 25 - a second port (314) operable to output a command, which command is suitable to control the source component,
 - a data processing unit (302) operable to decode the signal and to generate at least one command in response to the decoded signal.
- 30

4. An apparatus as claimed in claim 3 wherein the first port is operable to receive the signal via Scart, which signal comprises at least one Project50 message.

5 5. An apparatus as claimed in claim 3 wherein the first port is operable to receive the signal via HDMI, which signal comprises at least one CEC message.

6. An apparatus as claimed in claim 3 wherein the first port is operable to
10 receive the signal via IEEE1394 bus, which signal comprises at least one IEEE1394 message.

7. An apparatus as claimed in claim 3 wherein the first port is operable to receive the signal via infrared, which signal comprises at least one remote
15 control command associated with the destination component.

8. An apparatus as claimed in claim 3 wherein the first port is operable to receive the signal via radio, which signal comprises at least one radio
20 message.

9. An apparatus as claimed in claim 3 wherein the second port is operable to output the command via Scart, which command comprises at least one Project50 message.

25 10. An apparatus as claimed in claim 3 wherein the second port is operable to output the command via HDMI, which command comprises at least one CEC message.

11. An apparatus as claimed in claim 3 wherein the second port is operable
30 to output the command via IEEE1394 bus, which command comprises at least one IEEE1394 message.

12. An apparatus as claimed in claim 3 wherein the second port is operable to output the command via infrared, which command comprises at least one remote control command associated with the source component.

5 13. An apparatus as claimed in claim 3 wherein the second port is operable to output the command via radio, which command comprises at least one radio message.

10 14. A home entertainment system (400) comprising a destination component (404) operable to consume AV content (406) and a source component (402) operable to playout AV content in dependence on a signal (408), which signal indicates whether the destination component is presently consuming AV content originating from the source component.

15 15. A home entertainment system comprising a destination component (504) operable to consume AV content (506), a source component (502) operable to playout AV content and an apparatus (510) operable to control (512) the source component in dependence on a signal (508), which signal indicates whether the destination component is presently consuming AV
20 content originating from the source component.

16. A home entertainment system according to claim 14 or 15 wherein the destination component is operable to generate the signal.

25 17. A source component comprising an apparatus as claimed in any claim 3 to 13.

18. A destination component comprising an apparatus as claimed in any claim 3 to 13.

1/4

100

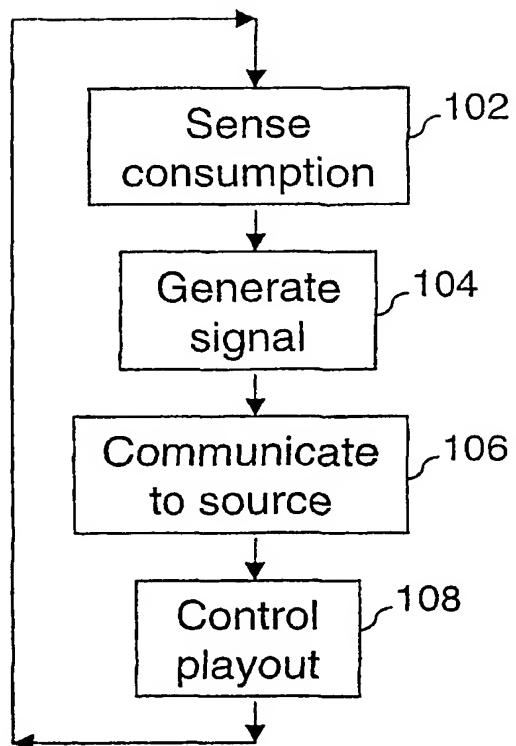


FIG.1

200

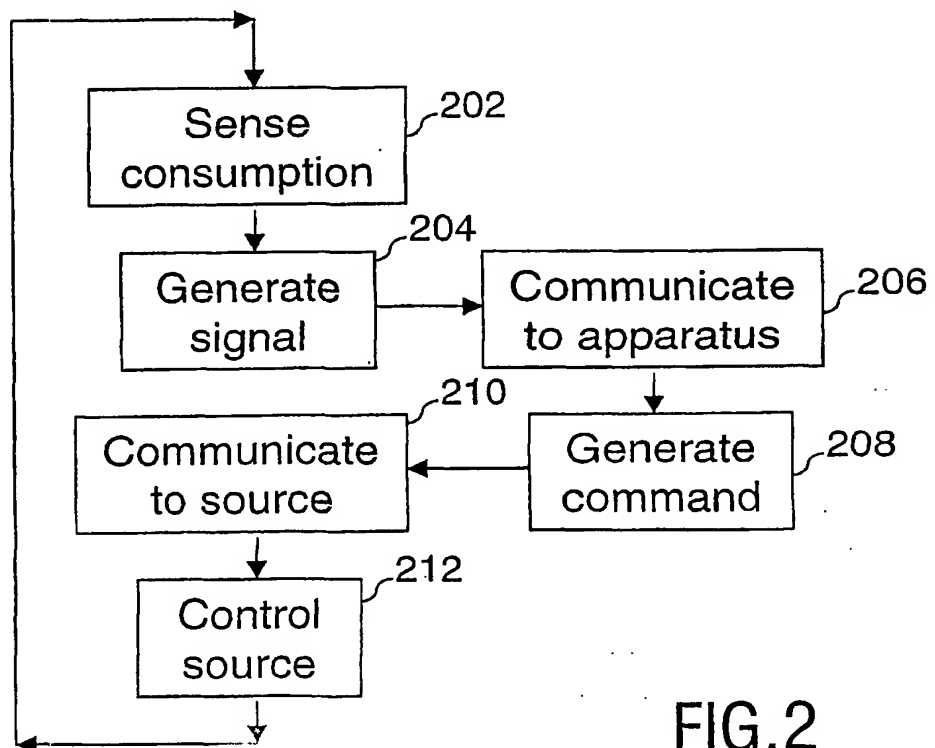


FIG.2

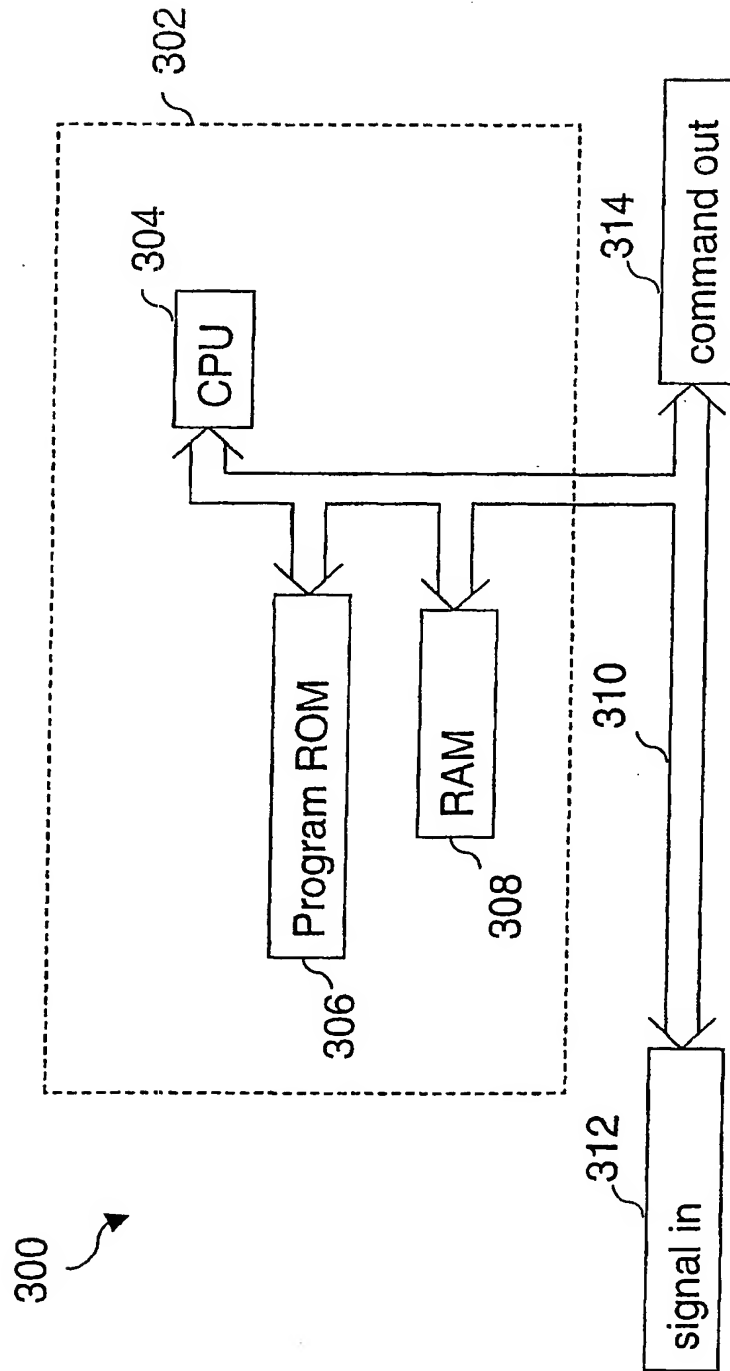


FIG.3

3/4

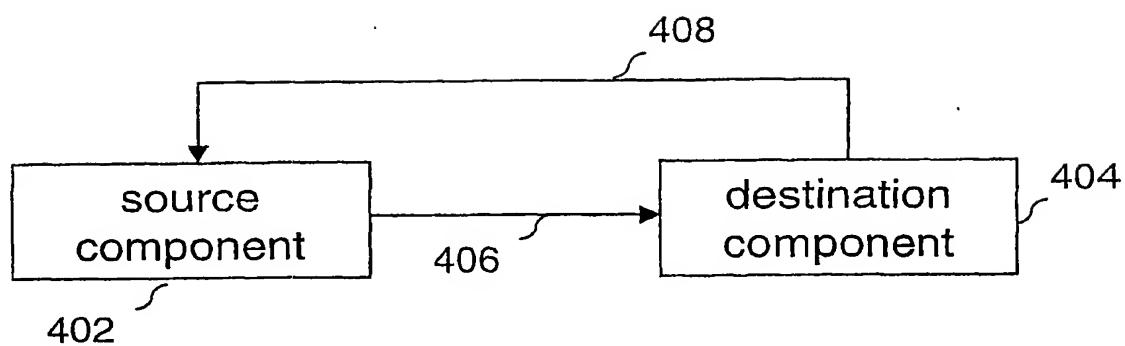
400


FIG. 4

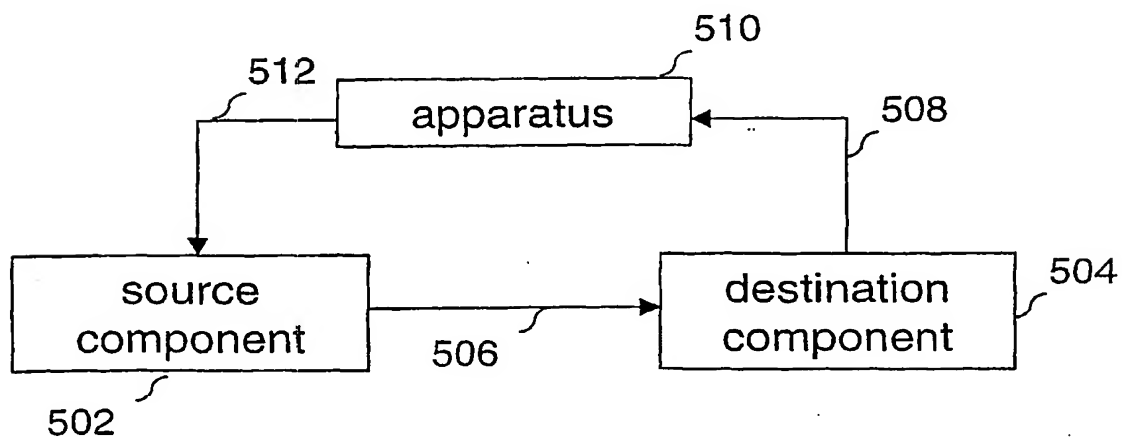
500


FIG. 5

4/4

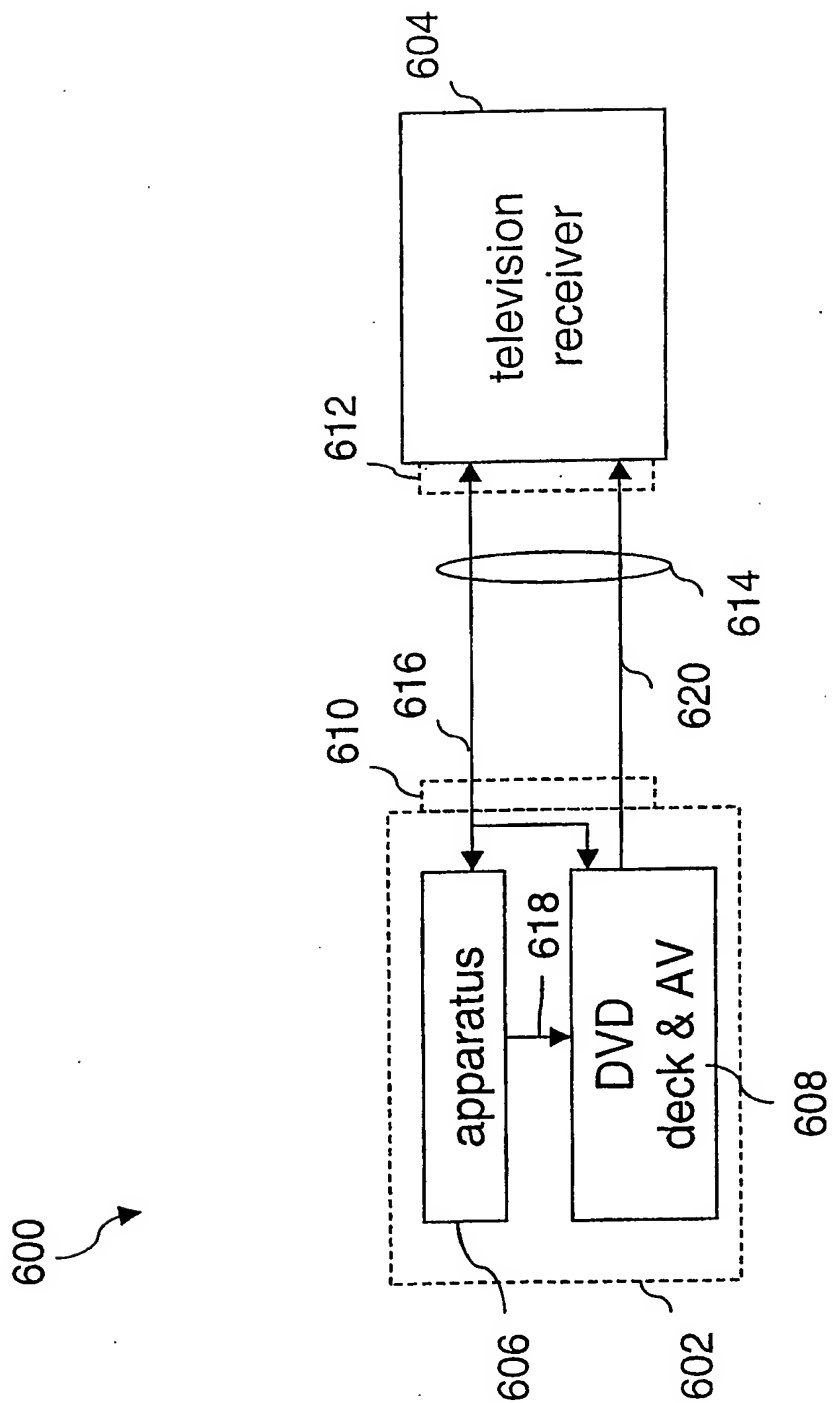


FIG.6

INTERNATIONAL SEARCH REPORT

PCT/IB 03/01747

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 H04N7/173 H04N5/775 H04N7/10

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
 IPC 7 H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 550 642 A (KIM SUNG J ET AL) 27 August 1996 (1996-08-27) column 2, line 14 -column 5, line 49; figure 2	1-18
Y	EP 1 176 815 A (TOKYO SHIBAURA ELECTRIC CO) 30 January 2002 (2002-01-30) column 1, line 1 -column 2, line 44; figures 1-5	1-18
Y	US 5 771 329 A (YUN SEOK-HO) 23 June 1998 (1998-06-23) column 1, line 35 -column 1, line 49; figure 2	1-18
	--- -/-- ---	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- *Z* document member of the same patent family

Date of the actual completion of the international search

22 July 2003

Date of mailing of the international search report

29/07/2003

Name and mailing address of the ISA
 European Patent Office, P.B. 5818 Patentlaan 2
 NL - 2280 HV Rijswijk
 Tel: (+31-70) 340-2040, Tx. 31 651 epo nl,
 Fax: (+31-70) 340-3016

Authorized officer

Luckett, P

INTERNATIONAL SEARCH REPORT

PCT/IB 03/01747

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5 915 206 A (BUERKLIN HELMUT ET AL) 22 June 1999 (1999-06-22) column 4, line 49 -column 5, line 21; figure 2 ----	1-18
Y	GB 2 317 762 A (HITACHI LTD) 1 April 1998 (1998-04-01) page 4, line 4 -page 5, line 6 ----	1-18
Y	US 5 351 096 A (PARK CHUNG S) 27 September 1994 (1994-09-27) column 2, line 30 -column 6, line 48 -----	1-18

INTERNATIONAL SEARCH REPORT

Information on patent family members

PCT/IB 03/01747

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5550642	A	27-08-1996	CN 1075840 A ,B GB 2263029 A ,B JP 2696155 B2 JP 6012843 A KR 223714 B1	01-09-1993 07-07-1993 14-01-1998 21-01-1994 15-10-1999
EP 1176815	A	30-01-2002	JP 2002044095 A EP 1176815 A2 US 2002021372 A1	08-02-2002 30-01-2002 21-02-2002
US 5771329	A	23-06-1998	CN 1164741 A ,B GB 2310773 A ,B	12-11-1997 03-09-1997
US 5915206	A	22-06-1999	FR 2726720 A1 EP 0715465 A1 JP 8237276 A DE 69512184 D1 DE 69512184 T2	10-05-1996 05-06-1996 13-09-1996 21-10-1999 20-01-2000
GB 2317762	A	01-04-1998	JP 7075030 A CN 1118966 A ,B GB 2279833 A ,B JP 2002238001 A US 5576773 A US 5828417 A	17-03-1995 20-03-1996 11-01-1995 23-08-2002 19-11-1996 27-10-1998
US 5351096	A	27-09-1994	KR 9407578 B1 JP 5081839 A	20-08-1994 02-04-1993